Degenerate kernels of first boundary integral equation
$U(s,x)=\begin{cases} U^{I}(s,x)=\rho^{2}(1+\ln R)+R^{2}\ln R-[R\rho(1+2\ln R)+\frac{1}{2}\frac{\rho^{3}}{R}]\cos(\theta-\phi)-\sum_{m=2}^{\infty}[\frac{1}{m(m+1)}\frac{\rho^{m+2}}{R^{m}}-\frac{1}{m(m-1)}\frac{\rho^{m}}{R^{m-2}}]\cos[m(\theta-\phi)], \quad R>\rho \\ U^{E}(s,x)=R^{2}(1+\ln\rho)+\rho^{2}\ln\rho-[\rho R(1+2\ln\rho)+\frac{1}{2}\frac{R^{3}}{\rho}]\cos(\theta-\phi)-\sum_{m=2}^{\infty}[\frac{1}{m(m+1)}\frac{R^{m+2}}{\rho^{m}}-\frac{1}{m(m-1)}\frac{R^{m}}{\rho^{m-2}}]\cos[m(\theta-\phi)], \quad \rho>R \end{cases}$
$\Theta(s,x)=\begin{cases} \Theta^{I}(s,x)=\frac{\rho^{2}}{R}+R(1+2\ln R)-[\rho(3+2\ln R)-\frac{1}{2}\frac{\rho^{3}}{R^{2}}]\cos(\theta-\phi)+\sum_{m=2}^{\infty}[\frac{1}{m+1}\frac{\rho^{m+2}}{R^{m+1}}-\frac{m-2}{m(m-1)}\frac{\rho^{m}}{R^{m-1}}]\cos[m(\theta-\phi)], \quad R>\rho \\ \Theta^{E}(s,x)=2R(1+\ln\rho)-[\rho(1+2\ln\rho)+\frac{3}{2}\frac{R^{2}}{\rho}]\cos(\theta-\phi)-\sum_{m=2}^{\infty}[\frac{m+2}{m(m+1)}\frac{R^{m+1}}{\rho^{m}}-\frac{1}{m-1}\frac{R^{m-1}}{\rho^{m-2}}]\cos[m(\theta-\phi)], \quad \rho>R \end{cases}$
$M(s,x)=\begin{cases} M^{I}(s,x)=(\nu-1)\frac{\rho^{2}}{R^{2}}+(\nu+3)+2(\nu+1)\ln R-[(\nu+1)\frac{2\rho}{R}-(\nu-1)\frac{\rho^{3}}{R^{3}}]\cos(\theta-\phi)+\sum_{m=2}^{\infty}[(\nu-1)\frac{\rho^{m+2}}{R^{m+2}}+\frac{m(1-\nu)-2(1+\nu)}{m}\frac{\rho^{m}}{R^{m}}]\cos[m(\theta-\phi)], \quad R>\rho \\ M^{E}(s,x)=2(1+\nu)(1+\ln\rho)-(\nu+3)\frac{R}{\rho}\cos(\theta-\phi)+\sum_{m=2}^{\infty}[\frac{m(\nu-1)-2(\nu+1)}{m}\frac{R^{m}}{\rho^{m}}+(1-\nu)\frac{R^{m-2}}{\rho^{m-2}}]\cos[m(\theta-\phi)], \quad \rho>R \end{cases}$
$V(s,x)=\begin{cases} V^{I}(s,x)=\frac{4}{R}+[\frac{2\rho}{R^{2}}(3-\nu)-\frac{\rho^{3}}{R^{4}}(1-\nu)]\cos(\theta-\phi)-\sum_{m=2}^{\infty}[m(1-\nu)\frac{\rho^{m+2}}{R^{m+3}}-(4+m(1-\nu))\frac{\rho^{m}}{R^{m+1}}]\cos\left[m(\theta-\phi)\right], \quad R>\rho \\ V^{E}(s,x)=(-3-\nu)\frac{1}{\rho}\cos(\theta-\phi)+\sum_{m=2}^{\infty}[(m(1-\nu)-4)\frac{R^{m-1}}{\rho^{m}}-m(1-\nu)\frac{R^{m-3}}{\rho^{m-2}}]\cos\left[m(\theta-\phi)\right], \quad \rho>R \end{cases}$

Degenerate kernels of second boundary integral equation
$U_\theta(s,x)=\begin{cases} U_\theta^I(s,x)=2\rho(1+\ln R)-[R(1+2\ln R)+\frac{3}{2}\frac{\rho^2}{R}]\cos(\theta-\phi)-\sum_{m=2}^{\infty}[\frac{m+2}{m(m+1)}\frac{\rho^{m+1}}{R^m}-\frac{1}{m-1}\frac{\rho^{m-1}}{R^{m-2}}]\cos[m(\theta-\phi)], & R>\rho \\ U_\theta^E(s,x)=\frac{R^2}{\rho}+\rho(1+2\ln\rho)-[R(3+2\ln\rho)-\frac{1}{2}\frac{R^3}{\rho^2}]\cos(\theta-\phi)+\sum_{m=1}^{\infty}[\frac{1}{m+1}\frac{R^{m+2}}{\rho^{m+1}}-\frac{m-2}{m(m-1)}\frac{R^m}{\rho^{m-1}}]\cos[m(\theta-\phi)], & \rho>R \end{cases}$
$\Theta_\theta(s,x)=\begin{cases} \Theta_\theta^I(s,x)=\frac{2\rho}{R}-[(3+2\ln R)-\frac{3}{2}\frac{\rho^2}{R^2}]\cos(\theta-\phi)+\sum_{m=2}^{\infty}[\frac{m+2}{m+1}\frac{\rho^{m+1}}{R^{m+1}}-\frac{m-2}{m-1}\frac{\rho^{m-1}}{R^{m-1}}]\cos[m(\theta-\phi)], & R>\rho \\ \Theta_\theta^E(s,x)=\frac{2R}{\rho}-[(3+2\ln\rho)-\frac{3}{2}\frac{R^2}{\rho^2}]\cos(\theta-\phi)+\sum_{m=2}^{\infty}[\frac{m+2}{m+1}\frac{R^{m+1}}{\rho^{m+1}}-\frac{m-2}{m-1}\frac{R^{m-1}}{\rho^{m-1}}]\cos[m(\theta-\phi)], & \rho>R \end{cases}$
$M_\theta(s,x)=\begin{cases} M_\theta^I(s,x)=\frac{2\rho}{R^2}(\nu-1)-[\frac{2}{R}(\nu+1)-3(\nu-1)\frac{\rho^2}{R^3}]\cos(\theta-\phi)+\sum_{m=2}^{\infty}[(m+2)(\nu-1)\frac{\rho^{m+1}}{R^{m+2}}+(m(1-\nu)-2(1+\nu))\frac{\rho^{m-1}}{R^m}]\cos[m(\theta-\phi)], & R>\rho \\ M_\theta^E(s,x)=\frac{2(1+\nu)}{\rho}+(\nu+3)\frac{R}{\rho^2}\cos(\theta-\phi)-\sum_{m=2}^{\infty}[(m(\nu-1)-2(\nu+1))\frac{R^m}{\rho^{m+1}}+(m-2)(1-\nu)\frac{R^{m-2}}{\rho^{m-1}}]\cos[m(\theta-\phi)], & \rho>R \end{cases}$
$V_\theta(s,x)=\begin{cases} V_\theta^I(s,x)=[\frac{2}{R^2}(3-\nu)-3(1-\nu)\frac{\rho^2}{R^4}]\cos(\theta-\phi)-\sum_{m=2}^{\infty}[m(m+2)(1-\nu)\frac{\rho^{m+1}}{R^{m+3}}-m(4+m(1-\nu))\frac{\rho^{m-1}}{R^{m+1}}]\cos\left[m(\theta-\phi)\right], & R>\rho \\ V_\theta^E(s,x)=(3+\nu)\frac{1}{\rho^2}\cos(\theta-\phi)-\sum_{m=2}^{\infty}[m(m(1-\nu)-4)\frac{R^{m-1}}{\rho^{m+1}}-m(m-2)(1-\nu)\frac{R^{m-3}}{\rho^{m-1}}]\cos\left[m(\theta-\phi)\right], & \rho>R \end{cases}$

Degenerate kernels of boundary integral equation for vorticity
$U_{\nabla^2}(s,x)=\begin{cases} U^I_{\nabla^2}(s,x)=4(1+\ln R)-4\frac{\rho}{R}\cos(\theta-\phi)-\sum_{m=2}^{\infty}\frac{4}{m}\frac{\rho^m}{R^m}\cos[m(\theta-\phi)], & R>\rho \\ U^E_{\nabla^2}(s,x)=4(1+\ln R)-4\frac{R}{\rho}\cos(\theta-\phi)-\sum_{m=2}^{\infty}\frac{4}{m}\frac{R^m}{\rho^m}\cos[m(\theta-\phi)], & \rho>R \end{cases}$
$\Theta_{\nabla^2}(s,x)=\begin{cases} \Theta^I_{\nabla^2}(s,x)=\frac{4}{R}+4\frac{\rho}{R^2}\cos(\theta-\phi)+\sum_{m=2}^{\infty}4\frac{\rho^m}{R^{m+1}}\cos[m(\theta-\phi)], & R>\rho \\ \Theta^E_{\nabla^2}(s,x)=-\frac{4}{\rho}\cos(\theta-\phi)-\sum_{m=2}^{\infty}4\frac{R^{m-1}}{\rho^m}\cos[m(\theta-\phi)], & \rho>R \end{cases}$
$M_{\nabla^2}(s,x)=\begin{cases} M^I_{\nabla^2}(s,x)=\frac{4}{R^2}(\nu-1)+8(\nu-1)\frac{\rho}{R^3}\cos(\theta-\phi)+\sum_{m=2}^{\infty}4(m+1)(\nu-1)\frac{\rho^m}{R^{m+2}}\cos[m(\theta-\phi)], & R>\rho \\ M^E_{\nabla^2}(s,x)=\sum_{m=2}^{\infty}4(m-1)(\nu-1)\frac{R^{m-2}}{\rho^m}\cos[m(\theta-\phi)], & \rho>R \end{cases}$
$V_{\nabla^2}(s,x)=\begin{cases} V^I_{\nabla^2}(s,x)=8(\nu-1)\frac{\rho}{R^4}\cos(\theta-\phi)+\sum_{m=2}^{\infty}4m(m+1)(\nu-1)\frac{\rho^m}{R^{m+3}}\cos[m(\theta-\phi)], & R>\rho \\ V^E_{\nabla^2}(s,x)=-\sum_{m=2}^{\infty}4m(m-1)(\nu-1)\frac{R^{m-3}}{\rho^m}\cos[m(\theta-\phi)], & \rho>R \end{cases}$

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